M – 8

MATH PROBLEM SOLVING SKILLS PRIMARY SCHOOL STUDENTS IN MATHEMATICS COMPETITION THE UNIVERSITY DAYANU IKHSANUDDIN BAUBAU

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Abstrack

The mathematical problem solving skill is an effort to find solution of mathematical problem that is faced by students. In problem solving process, the students leadtheir entirecapability. The competencies which are used in problem solving namely rationality, creativity, and other thinking abilities. Problem solving needs conceptual understanding ability (conceptual knowledge), ability to do inter-conceptual relationship (principle and procedure), accuracy, and student's mental readiness. Problem solving is an important aspect in learning mathematics. A student called mastering certain mathematics lesson if he/she has a problem solving skillwhich is contained in the lesson. Problem solving skill is necessary to be implemented to the student's competency from the elementary school. Problem solving skill is need to be trained and be accustomed to the student as early as possible.It is significant because the students haveskill to solve mathematical problem when they have many experiences. The experience of mathematical problem solving will be provision for facing daily life problems. Problem solving skill relates to lessons in curriculum. It is in order to see how far the student's skill in calculating, remembering, and applying mathematical formula relevantly. The results of mathematical problem solving ability of primary school students in the category which is equal to 56.50% of the 915 questions. Problems that can be completed correctly that as many as 517 questions that consists of 392 questions form Algebra, 93 about the form of Geometry, and Algebra 32 question form with the average time required for 51.1 minutes. In solving the problem, students will have a motivation to use continuously their knowledgeif the result that obtained is a solution from the problem they faced.
Keywords: problem solving skill, mathematics school.

INTRODUCTION

Mathematics in primary education has an important role in sustainable life because this level is the foundation of a very decisive in shaping attitudes, intelligence, knowledge, solve problems, and form a formidable personality of the child. Math lessons given mainly in basic education meant that at the end of each stage of education learners have certain abilities for the next life. The phenomenon of the field shows that the persistence of primary school students who have difficulty in dealing with problems in math, think math is not interesting, and boring. This complaint directly or indirectly will greatly affect the learning achievement of the observer while the other hand continues to strive to introduce educational and interesting mathematics. One of the interesting mathematical form of recognition that by hosting various competitions both at local, national, and international levels. Until in the end local and central government is very supportive by providing the highest appreciation for students who succeeded the name of the region and nation. Unmitigated lately the government through the Ministry of Education provides scholarships for continuing education kejenjang higher for students who earn a medal

at the international level. This achievement is certainly very encouraging for him, his family, and also the name of the region.

Mathematics competitions held by each agency aims to improve analytical capabilities, creative, critical, problem solving abilities and hone the reasoning power of the students. In essence, the application of mathematical knowledge of the subject matter is not only in the classroom, but also applicable in various contexts of mathematics. It aims to look at the extent to which students are able to understand and master mathematics in school. It is also in line with that proposed by the Ministry of Education (2006) that the elementary school mathematics courses have the aim that students have the ability to: (a). Understand mathematical concepts, explains the relationship between concepts, and apply the concepts or algorithms flexibly, accurately and efficiently, and appropriately in solving the problem, (b). Using the pattern and nature of the reasoning, mathematical manipulation in making generalizations, compile evidence, or explain ideas and mathematical statements, (c). Solve problems that include the ability to understand the problem, devised a mathematical model, resolve and interpret the obtained solution, (d). communicate ideas with symbols, tables, diagrams, or other media to clarify the situation or problem; and (e). Having respect for the usefulness of mathematics in life, which has a curiosity, attention and interest in studying mathematics, as well as a tenacious attitude and confidence in solving problems.

Compitition mathematical carried apply the appropriate scope of the guidance material Depdiknas. Competition mathematics courses in the educational unit SD / MI in accordance with the covering aspects of numbers, geometry and measurement, and data processing (Depdiknas, 2006). Knowledge of students is always growth and perkembanagan relevant. The brain is able to mnyerap knowledge students according to age level. The development of new knowledge structures composed of prior knowledge. Developing knowledge structure based on the mental development of the individual student. growth characteristics of elementary school students have relevant developments with changes in the level and function of the characteristics of the age of the students. The knowledge of different grade 3 students with the knowledge possessed by students in grade 6. This According to Piaget (Dahar, 1991: 152) the stage of cognitive development of children include: first sensory-motor stage (ages 0-2 years) at this stage children set natural with the senses (sensory) and actions (motor), both pre-operational stage (2-7 years old) at this stage the level of intellectual development of students is divided into two namely sub-level pralogis (2-4 years) and the level of thinking intuitive (4-7 years), three concrete operational stage (ages 7-11 years) at the beginning of this stage is the stage of rational thinking, this means that the child already has a logical operations that can be applied to concrete problems, and the last operational phase Formal (ages 11 years and so on) at this stage the child can use concrete operations to establish operations more complex, this can be seen in children who are not bullet think with the help of objects because iniu diperode child has been able to think abstractly .

Based on the child's cognitive development theory proposed by Piaget, the students who participated in this competition are students concrete operational and formal operational stage. This is supported by research Driscoll (Suherman, et al 2003: 91) states that at the age of elementary school children to be intimately linked with problem solving skills. So with this stage students are able to use imagination, reasoning power and kretaifitasnya in solving the problem. In the implementation of this math competition also strived minimized using concrete objects or pictures. So the correct solution they found was the understanding and application of mathematical concepts discoveries that have experienced students.

According Hodojo (1988) and learning experience of a student will affect subsequent mathematics learning process. This means that students will be trained with basic knowledge questions, then understanding the concept earlier in elementary school will greatly affect the further mastery of the material at a higher level. One of the demands in learning mathematics for students in schools is the ability to solve mathematical problems. Solving math problems in school is seen as one alternative to find out that a student has been able to master a particular material. In the process of solving the problem of students directs segalah knowledge to be able

to finish it. Begin of collecting facts, finishing with the concept, to draw conclusions. In an effort to solve the problems of the students towards mathematics needed tricks or methods that must be mastered and performed by each student. Trick or method performed based on the experience of students.

One of the objectives given in the math curriculum for students is that students have the ability to problem-solving. Mathematics then taught school for students that in order to have the knowledge, understanding, abilities, and skills in solving math problems or have the ability to solve the problems of mathematics. it is becoming important taught in school that the students have experience in troubleshooting. Similarly, according Dwiyoso (Purba, that the purpose of education in schools not only enhance the acquisition of knowledge, but should be able to develop problem solving skills. The so-called mathematical problem here is the mathematical problems that can not be directly answered by the student or direct proficiency level problems can be answered with routine procedures, but rather problems that are solved by using the method or certain tricks.

Problems in mathematics is not a problem whose solution only use is common knowledge in class. But the problem is presented requires the ability to find, megolah, collect, and dig information from around the problem. The issues presented are simple problems but requires enough knowledge to get the solution of the problem. According Hudoyo (1988: 122) that the problem situations presented to learners should be simple enough to be managed, yet complex enough to be resolved. Situation problem simple yet complex penyelesaianya takes control of the structure of the concept, the structure of the procedure, or surgery are used in solving the problem.

According Suherman, et al (2003: 92-93) that a problem usually includes a situation that encourages someone to finish it but do not know directly what to do to solve it. That is to address these problems requires a student experiences in resolving issues / problems of the non-routine. based on this opinion is also a problem and solving the problem of the unity of meaning said means requires students to have a desire to get it done.

Based on the opinions of the above it can be concluded that the issues or questions raised by others is a problem when the problem challenging or desire to finish with the completion of the use of tricks, methods, or procedures that are not normally (non-routine).

Elementary students is basically an initial foundation to instill problem-solving abilities. The purpose of school students one of them in order to have the ability to solve problems encountered throughout his life. By him that students should be taught from an early age the ability to solve the problems encountered. Thus, students are able to think independently, creatively and critically. Problem solving skills students need skills. Good memorization skills, the ability to reason, creative, always sensitive to the problem.

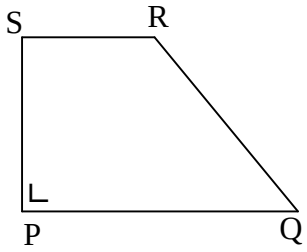
Effort a student in order to have the ability in solving mathematical problems right that he should recognize, explore, and understand the problem clearly. A student is able to recognize the basic overview of the problems encountered. By making it the problem will be felt easily. In recognizing the problem, determine the length of time it takes to solve different, there is a fast finish, there also took a long time to complete. This difference depends on the extent to which the student is able to recognize the information in the problem. Also depends on the familiarity of students to the problem. rapid students in completing the problem means that students have had good experience with problem solving.

According Hudoyo (2003: 91) that the mathematical problem solving ability of students to be tailored to the child's level of ability. In applying problem solving skills required of a student's thought process. The thought process is defined as the process of generating a new mental representation through the transformation of information that involve complex interactions only between mental attributes such as assessment, abstraction, reasoning, imagination, and problem solving (Glass and Holyoank, 1986; Solso, 1988). In applying the guidance of the troubleshooting process will make the process of thought to represent the cognitive abilities such as memory, understand, apply, analyze, evaluate, and create. According to psychologists learning Anderson & Krahwohl (2010: 99) in order to determine the category

in the dimension of the cognitive process the teacher can provide the questions. The categories and cognitive processes (Anderson & Krahwohl 2010: 100-102) are as follows:

1. Given: take the knowledge of the long-term
   a. Recognize
   b. Recalling
   Cognitive processes: Students will declare the results of operations mixture of single-digit numbers
   Example question: What is the result of (-2) x (-5) + 2?
2. Understanding: constructing knowledge of instructional materials, including what is spoken, written, and drawn by the teacher.
   a. Interpret
   b. Exemplifying
   c. Classify
   d. Embrace
   e. Conclude
   f. Compare
   g. Explain

   Cognitive processes: Students will interpret the results of the cube root of a number
   Example question: Determine $\sqrt[3]{1331}$?
3. Apply: apply or use a procedure in certain circumstances.
   a. Execute
   b. Implements
   Cognitive processes: Students will use a non-routine procedures
   Example question: Given the number of different two numbers is 15 and the difference between the two numbers is 3. Determine the numbers?
4. Analyze: breaking down the material so its constituent parts and determine the relationships between the parts and the relationships between the parts and the overall structure or purpose.
   a. Distinguish
   b. Organize
   c. Attribute
   Cognitive processes: Students will distinguish the factors primes
   Example question: Determine the number of prime factors of 360 and 900?
5. Evaluate: make decisions based on the criteria and / or standards.
   a. Check Up
   b. Criticize
   Cognitive processes: Students will describe and compare the standard algorithm
   Example question: In the world of fairy tales days used only 5 ie, Monday, Wednesday, Friday, Saturday, and Sunday. If today is Wednesday, the fairytale world in which to-day is 378?
6. Creating: Integrating the parts to create something new and coherent or to make an original product
   a. Formulate
   b. Plan
   c. Produce
   Cognitive processes: Students will plan troubleshooting
   Example question: Consider Figure!



Known PQRS is a right-angled trapezium, PQ parallel to SR, and PQ + SR = RQ, if a display PS = 16 cm, then turned away cm long kah PQ x SR is...

Mathematics competition held by institutions Ikhsanuddin Baubau Dayanu University named Creativity Competition Students Areas of Study Mathematics elementary, junior high, high school / vocational or equivalent is an annual event that in 2015 for the sixteenth time. Creativity in question are all matters which contested the result of the creativity of students of mathematics education in these institutions. This contest shaped quiz. This year's event theme is "through mathematical competitions we develop and improve the talents and interests of students to create a generation of superior, intelligent, creative and noble". So from this activity seen in general elementary school students' ability in solving mathematical problems for later evaluation materials in the future.

METHODS

This study is a survey research. with the aim to see the mathematical problem solving abilities Where research is done by taking a random sample of the population. The population in this study consisted of 64 units of primary schools in the city of Baubau. While the sample in this study schools that signed up for the race competition cecerdas careful that as many as 48 schools. This study took place from 9 to 26 February 2015. That was the subject of this study is representative school students each consisting of 3 students from grade 4,5, and 6. The stages in this study are planning (the manufacturing problems), the implementation of the competition, and evaluation. Making matters in this menelitian covers material taught in class 4, 5, and 6. Especially for 6th grade material that is included in the making of a matter is material that semester in accordance with the Education Unit Level Curriculum (KTSP).

The material loaded in the manufacture of matter are summarized into three components: Algebra (Aspects Numbers, Arithmetic, and others), Geometry (measurement), and Statistics (data processing). For the manufacture of a matter, matter consists of 915 questions that consist of as many as 666 questions Algebra, Geometry of 196 questions, and Statistics as many as 53 questions. Then the evaluation, the evaluation phase of this research is to answer questions that students properly. Problem ang answered correctly by students based on tricks or methods that students understand. In solving the problem in this study did not assess the troubleshooting steps that formal. So the correct answer is defined as the completeness of student understanding in applying problem-solving abilities. Instruments used in the form of tests and observation sheet. Observation sheet used to see the questions that were answered correctly and incorrectly by the students. The data collected in this study were analyzed by triangulation, Saturation, and Common Sense.

RESULTS AND DISCUSSION

This activity lasted three phases, which are as follows:

a. Planning activities

   The questions that will be contested made by all students of mathematics education first semester, the questions are then selected and revised by a team of matter that are contested matters are matters that creative. Then such questions about the team coordinator verified again that lecturers of mathematics education in these institutions.

b. Implementation of activities

   The activities carried out in three stages namely:

1. Provision took place on 9 - February 23, 2015
2. Semi-finals take place on 23-24 February 2015
3. Final took place on February 26, 2015

During this activity lasted about who competed as much as 915 questions with details about the contested penyisian half as many as 757 questions, the semi-finals as many as 105 questions, and a final round of 53 questions. Of the 915 contested matter also detailed questions about the form of Algebra as much as 666, as many as 196 questions about geometry, and statistics about the total 53 questions.

c. Evaluation

At the evaluation stage any questions about the suitability evaluated competed with the time it takes students to complete. Problems first settled by the manufacturer about the team in the shortest possible time. From this stage also a matter in the evaluation of the questions that were answered correctly and incorrectly answered. Questions can be answered correctly said that the matter of the level of students' problem solving otherwise completed while that can not be answered correctly means solving the problem of students not yet complete. The data of mathematical problem solving ability of students is as follows.

Table 1.
Data mathematical problem solving ability of students elementary school level city Baubau

Responden	Many Problem Elementary School						Total (Problem)	Time (Menit)
	Algebra		GeometrY		Statistika			
	True	False	True	False	True	False		
1	17	5	5	5	4	1	37	52.5
2	25	6	13	0	1	1	46	52.5
3	14	11	6	1	2	1	35	52.5
4	12	9	2	3	3	1	30	52.5
5	11	10	2	9	2	1	35	52.5
6	15	9	2	5	1	0	32	52.5
7	19	6	4	3	4	0	36	52.5
8	14	8	2	3	2	1	30	52.5
9	8	13	4	3	3	0	31	52.5
10	10	9	2	3	1	2	27	52.5
11	4	18	2	10	0	0	34	52.5
12	7	18	4	1	1	1	32	52.5
13	6	12	0	5	0	3	26	52.5
14	15	12	3	4	1	0	35	52.5
15	16	13	2	4	2	0	37	52.5
16	20	5	5	3	2	2	37	52.5
17	29	7	3	2	0	0	41	52.5
18	16	9	3	2	0	1	31	52.5
19	15	12	5	2	1	2	37	52.5
20	11	14	3	6	0	1	35	52.5

21	6	21	3	5	1	0	36	45
22	21	10	2	4	0	0	37	45
23	23	3	7	4	1	2	40	45
24	14	13	3	4	0	0	34	45
25	16	8	2	5	0	0	31	45
26	28	13	4	7	0	1	53	52.5
Amount	**392**	**274**	**93**	**103**	**32**	**21**	**915**	**1327.5**
	666		**196**		**53**			
Percentage	**58.86**	**41.14**	**47.45**	**52.55**	**60.38**	**39.62**		
	72.79		**21.42**		**5.79**		**100.00**	

According to the table above for respondents 1-16 followed each of 3 different schools, while respondents 17-26 at follow 2 to 3 different schools. Schools on respondents 17-26 are schools that passed in the previous stage. The game is followed by only two schools took over 45 minutes to finish the question. While the games are only followed by 3 schools need time for 52.5 minutes in solving problems. In each game the number of different problems. During this math game to spend about as much as 915 questions with the average time taken in once a match is 51.1 minutes. A total of 915 contested matter comprised of as many as 666 questions about Algebra, or 72.79%, as many as 196 questions about geometry or 21.42%, and as many as 53 questions about statistics or 5.79%. Algebra Problem that can be answered correctly by a total of 392 students, or about 58.86%, about geometry capable diajawab right by about 93 students or 47.45% while the matter of statistics that can be answered correctly by students as many as 32 problems or 60.38%. So based on student answers correctly, math problem solving skills of elementary school students that is as much as about 517 or 56.50% of the total of 915 questions.

After collecting the data acquisition scores of mathematical problem solving ability of primary school students. Provisions total scores obtained from the results of this study were categorized based on Anwar Saifuddin table below.

Table 2.
Criteria for mathematical problem solving ability of students

Interval	Kategori
$M > 68.625$	very High
$53.375 < M \leq 68.625$	high
$38.125 < M \leq 53.375$	Moderate
$22.875 < M \leq 38.125$	Low
$M \leq 22.875$	Very Low

Problem is capable of correctly answered questions means that as many as 517 scores collected at 51 700 elementary school students in the category.

CONCLUSION

Based on the above results it can be concluded that students' mathematical problem solving ability of 915 questions given. Of about 915 666 or 72.79% as a matter of form Algebra, 196 or 21.42% about the form of Geometry, and 53 or 5.79 about the form of Statistics. Of shape about algebra, which is a total of 392 questions answered correctly or incorrectly answered 58.86% and as much as about 274 or 41.14%. Of shape about geometry, the correct

answer 93 questions or 47.45% and answer any questions sebanak 103 or 52.55%. Statistics matter of form, the question is answered correctly by 32 or 60.38% and incorrectly answered question 21 or 39.62%. Of the 915 questions used during the game, as much as about 517 or 56.50% answered correctly and about 398 or 43.50% answered incorrectly. So based on the correct answer math problem solving ability Baubau city elementary school students in the category.

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